UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
West Coast Region
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UEC 1 8 2017

Mr. Jeff Rieker
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U.S. Bureau of Reclamation
3310 El Camino Avenue, Suite 300
Sacramento, California 95821

Re: Rapid Genetic Analysis of the Central Valley Project and State Water Project salvaged
        older juvenile Chinook salmon in Water Year 2018

Dear Mr. Rieker:

Thank you for your November 17, 2017, letter and enclosure to NOAA's National Marine
Fisheries Service (NMFS) describing the proposed protocol for rapid genetic analysis of Central
Valley Project (CVP) - and State Water Project (SWP) -salvaged older juvenile Chinook salmon
(*Oncorhynchus tshawytscha*) during water year (WY) 2018. The implementation of this genetic
analysis allowed the CVP and SWP to identify to race, the older juvenile Chinook salmon
salvaged in WYs 2016 and 2017, as necessary. Such identification aided in the more accurate
estimation of loss for the Sacramento River winter-run Chinook salmon, listed as endangered
under the Endangered Species Act (ESA) of 1973, as amended (16 U.S.C. 1531 *et seq.*). Rapid
genetic analysis allows for the discrimination between the different races of Chinook salmon
included within the older juvenile length-at-date criteria used at the fish salvage facilities, some
of which are listed under the ESA (*e.g.* winter-run Chinook salmon and Central Valley spring-
run Chinook salmon) and some of which are non-listed races under the ESA (*e.g.*, fall-run and
late fall-run Chinook salmon). Genetic race assignment allows the implementation of Reasonable
and Prudent Alternative (RPA) actions IV.2.3 and IV.3 to be better targeted to ESA-listed
Chinook salmon.

Under the current RPA action trigger criteria, NMFS uses older juvenile Chinook salmon as the
surrogate for winter-run and yearling spring-run Chinook salmon. This categorization, based on
the length-at-date criteria, includes older fall-run and late-fall run Chinook salmon, which are not
listed.

NMFS agrees that implementing the rapid genetic analysis methodology provides the
opportunity to more accurately identify salvaged salmonids and, thus, balance the required
protection of listed salmon with water diversions at the Projects when feasible. Accurately
identifying listed fish that are the focus of the RPA actions will reduce the reductions of exports

identifying listed fish that are the focus of the RPA actions will reduce the reductions of exports due to fish misidentified as a listed fish based on length-at-date. However, adjustments to the action triggers are necessary in order to accommodate the use of rapid genetic analysis. The first trigger level in OMR flow management RPA Action IV.2.3 will be based on application of the genetic winter-run based incidental take limit of 1% (see second column in table). The minimum loss density trigger level of 2.5 fish/TAF remains the same. The second trigger level in OMR flow management RPA Action IV.2.3 remains the same, but will be based on genetic determination following rapid genetic analysis (because there was no indication in the 2009 RPA, with 2011 amendments, the anticipated percentage error in identifying yearling spring-run by length-at-date), but clarified to apply to genetic winter-run, rather than older juvenile Chinook salmon. The following table summarizes the current OMR flow management RPA Action IV.2.3 triggers, and the triggers modified while implementing rapid genetic testing.

Date	Action Triggers per 2009 RPA with 2011 Amendment	Action Triggers Applying Rapid Genetic Analysis	Action Responses
January 1 – June 15 First Stage Trigger (increasing level of concern)	(1) Daily SWP/CVP older juvenile Chinook salmon[1] loss density (fish per taf) is greater than incidental take limit divided by 2000 (2 percent WR JPE ÷ 2000), with a minimum value of 2.5 fish per taf, or (2) daily SWP/CVP older juvenile Chinook salmon loss is greater than 8 fish/taf multiplied by volume exported (in taf) or (3) CNFH CWT LFR or LSNFH CWT WR cumulative loss greater than 0.5% for each surrogate release group, or (4) daily loss of wild steelhead (intact adipose fin) is greater than 8 fish/taf multiplied by volume exported (in taf)	(1) Daily SWP/CVP genetic winter-run[2] loss density (fish per taf) is greater than incidental take limit divided by 2000 (1 percent WR JPE ÷ 2000), with a minimum value of 2.5 fish per taf, or (2) daily SWP/CVP genetic winter-run loss is greater than 8 fish/taf multiplied by volume exported (in taf) or (3) CNFH CWT LFR or LSNFH CWT WR cumulative loss greater than 0.5% for each surrogate release group, or (4) daily loss of wild steelhead (intact adipose fin) is greater than 12 fish/taf multiplied by volume exported (in taf)	Reduce exports to achieve an average net OMR flow of (minus) -3,500 cfs for a minimum of 5 consecutive days. The five day running average OMR flows shall be no more than 25 percent more negative than the targeted flow level at any time during the 5-day running average period (*e.g.,* -4,375 cfs average over five days). Resumption of (minus) -5,000 cfs flows is allowed when average daily fish density is less than trigger density for the last 3 days of export reduction. Reductions are required when any one criterion is met.

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[1] "Older juvenile Chinook salmon" is defined as any Chinook salmon that is above the minimum length for winter-run Chinook salmon, according to the "Delta Model" length-at-date table used to assign individuals to race.

[2] Genetic winter-run within the older juvenile Chinook salmon length-at-date category

	(1) Daily SWP/CVP older juvenile Chinook salmon loss density (fish per taf) is greater than incidental take limit (2 percent of WR JPE) divided by 1000 (2 percent of WR JPE ÷ 1000), with a minimum value of 5.0³ fish per taf, or (2) daily SWP/CVP older juvenile Chinook salmon loss is greater than 12 fish/taf multiplied by volume exported (in taf), or (3) daily loss of wild steelhead (intact adipose fin) is greater than 12 fish/taf multiplied by volume exported (in taf)	(1) Daily SWP/CVP genetic winter-run loss density (fish per taf) is greater than incidental take limit (1 percent of WR JPE) divided by 1000 (1 percent of WR JPE ÷ 1000), with a minimum value of 5.0 fish per taf, or (2) daily SWP/CVP genetic winter-run loss is greater than 12 fish/taf multiplied by volume exported (in taf), or (3) daily loss of wild steelhead (intact adipose fin) is greater than 12 fish/taf multiplied by volume exported (in taf)	Reduce exports to achieve an average net OMR flow of (minus) -2,500 cfs for a minimum 5 consecutive days. Resumption of (minus) -5,000 cfs flows is allowed when average daily fish density is less than trigger density for the last 3 days of export reduction. Reductions are required when any one criterion is met.
January 1 - June 15 Second Stage Trigger (analogous to high concern level)			

The length-at-date criteria are also used to track the incidental take of natural-origin winter-run Chinook salmon at the export facilities. NMFS assumed that approximately 50 percent of the fish identified as winter-run by the length-at-date criteria are in fact salmon from the other races. To allow for errors in fish identification due to the use of the length-at-date criteria to determine salmon race (*i.e.,* differentiating from fall-run, late-fall run, and spring-run Chinook salmon), the authorized incidental take for naturally-produced winter-run Chinook salmon was established by NMFS in the CVP/SWP operations Biological Opinion as 2 percent of the Juvenile Production Estimate (JPE) (corresponding to expected take of genetic winter-run of 1 percent of the JPE). The use of genetic data to determine race of juvenile Chinook salmon observed at the CVP/SWP fish salvage facilities considerably reduces the uncertainty that was included in previous annual incidental take limits for winter-run. Therefore, the authorized level of incidental take (*i.e.,* reported as loss at the Delta fish salvage facilities) under the ESA for the combined CVP/SWP Delta pumping facilities would be 1 percent of the JPE as a result of using genetic determination.

Furthermore, while current practices have considered the potential for misidentification of older juvenile Chinook salmon from other races as being "winter-run" by the length-at-date criteria, there is also the issue of not accounting for genetic winter-run Chinook salmon that do not meet the minimum length-at-date size to be assigned into the winter-run category due to differential

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[3] DOSS advice:
http://www.westcoast.fisheries.noaa.gov/publications/Central_Valley/Water%20Operations/Delta%20Operations%20for%20Salmonids%20and%20Sturgeon/DOSS%20WY2016/2015.12.22_final_doss_notes.pdf;
NMFS determination:
http://www.water.ca.gov/swp/operationscontrol/calfed/womt/summaries/20151222_womt_summary.pdf

growth rates in response to variable environmental conditions, including water temperature and time of spawning. Since the genetic testing of Chinook salmon for the implementation of the RPA triggers is only conducted for "older juveniles," these fish would still not be accounted for under the rapid genetic analysis protocol for RPA triggers. Although those smaller winter-run will not count towards action triggers in RPA Actions IV.2.3 and IV.3, the loss associated with those smaller winter-run will need to be included in the annual 1% winter-run loss in the incidental take limit. This will require that all unclipped Chinook salmon have tissue samples collected for subsequent genetic analysis and the results reported to NMFS and the Delta Operations for Salmonids and Sturgeon group as the tests are completed throughout the season.

In conclusion, NMFS supports the use of the rapid genetic analysis protocol that you have proposed as a tool to accurately identify older juvenile Chinook salmon to race for water year 2018, and encourages Reclamation to continue its implementation in future years. To reiterate, part of Reclamation's rapid genetic analysis protocol describes that when RPA action triggers are exceeded, based on the initial determinations by length at date, the implementation of the appropriate RPA action response will be carried out immediately and NMFS notified of this action. Upon determination of the genetic identity of the fish collected that triggered the action, loss density of winter-run Chinook salmon will be recalculated (if necessary) based on genetically-determined run assignments. If the loss density based on genetic determination(s) exceeds the adjusted, genetic based, loss density trigger, then no changes in the implemented action are required. However, if the loss density based on genetic determination(s) does not exceed the adjusted, genetic based, trigger, or exceeds a different trigger (*e.g.*, requiring an OMR limit of -3,500 cfs rather than -2,500 cfs), operations may be modified to implement the action response (if any) appropriate for the genetics-based loss density.

We appreciate your continued cooperation in the conservation of listed species and their habitat, and look forward to working with you and your staff in the future. If you have any questions regarding this document, please contact Mr. Garwin Yip in our California Central Valley Office by telephone at (916) 930-3611 or by e-mail at garwin.yip@noaa.gov.

Sincerely,

Maria Rea
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Cc: File – ARN 151422SWR2006SA00268

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